WHAT IS CLAIMED IS:

1. An apparatus to estimate the direction to a disturbance source in a power system, the apparatus comprising:

a voltage transducer which is coupleable to the power system and produces a signal representative of a voltage in the power system;

a current transducer which is coupleable to the power system and produces a signal representative of a current flowing within the power system, the signal having a forward reference direction and a behind reference direction corresponding to the current flow; and

disturbance energy determination circuitry coupled to the voltage transducer and the current transducer, the circuitry determining a measure of disturbance energy and estimating a direction of disturbance energy flow with respect to the system as either in front of or behind the disturbance locating apparatus.

2. The apparatus of claim 1, further comprising:

disturbance power determination circuitry which determines a measure of disturbance power and estimates a direction of disturbance power flow with respect to the system as either in front of or behind the disturbance locating apparatus.

3. The apparatus of claim 2, wherein the disturbance power determination circuitry further comprises:
a computer readable storage medium operative to store a program, the program comprising an instruction code; and
a processor operatively coupled to the storage medium and operative to perform a processing function based upon the instruction code.

4. The apparatus of claim 2, wherein the disturbance power determination circuitry comprises dedicated circuitry.

5. The apparatus of claim 1, wherein the voltage transducer is coupled via a voltage transformer to the power system.

6. The apparatus of claim 1, wherein the current transducer is coupled via a current transformer to the power system.

7. The apparatus of claim 1, wherein the disturbance energy determination circuitry further comprises:
a computer readable storage medium operative to store a program, the program comprising an instruction code; and
a processor operatively coupled to the storage medium and operative to perform a processing function based upon the instruction code.

8. The apparatus of claim 1, wherein the disturbance energy determination circuitry comprises dedicated circuitry.

9. An apparatus to estimate the direction to a disturbance source in a power system, the apparatus comprising:

a voltage transducer which is coupleable to the power system and produces a signal representative of a voltage in the power system;

a current transducer which is coupleable to the power system and produces a signal representative of a current flowing within the power system, the signal having a forward reference direction and a behind reference direction corresponding to the current flow; and

disturbance power determination circuitry coupled to the voltage transducer and the current transducer, the circuitry determining a measure of disturbance power and estimating a direction of disturbance power flow with respect to the system as either in front of or behind the disturbance locating apparatus.

10. The apparatus of claim 9, further comprising:
disturbance energy determination circuitry which determines disturbance energy flowing in the line and estimates a direction of disturbance energy flow with respect to the system as either in front of or behind the disturbance locating apparatus.

11. The apparatus of claim 10, wherein the disturbance energy determination circuitry further comprises:
a computer readable storage medium operative to store a program, the program comprising an instruction code; and
a processor operatively coupled to the storage medium and operative to perform a processing function based upon the instruction code.

12. The apparatus of claim 10, wherein the disturbance energy determination circuitry comprises dedicated circuitry.

13. The apparatus of claim 9, wherein the voltage transducer is coupled via a voltage transformer to the power system.

14. The apparatus of claim 9, wherein the current transducer is coupled via a current transformer to the power system.

15. The apparatus of claim 9, wherein the disturbance power determination circuitry further comprises:

a computer readable storage medium operative to store a program, the program comprising an instruction code; and

a processor operatively coupled to the storage medium and operative to perform a processing function based upon the instruction code.

16. The apparatus of claim 9, wherein the disturbance power determination circuitry comprises dedicated circuitry.

17. For use in estimating the direction to a disturbance source in a power system, an apparatus comprising:

a voltage transducer coupleable to the power system and operative to produce a first signal representative of a voltage within the power system;

a current transducer coupleable to the power system and operative to produce a second signal representative of a current within the power system; and

a logic circuit coupled to the voltage transducer and the current transducer, the logic circuit being operative to calculate a disturbance quantity based upon the first and second signals, the logic circuit using the disturbance quantity to estimate the direction to the disturbance source.

18. The apparatus of claim 17, wherein the disturbance quantity comprises a measure of disturbance power.

19. The apparatus of claim 17, wherein the disturbance quantity comprises a measure of an initial peak of a disturbance power signal.

20. The apparatus of claim 17, wherein the disturbance quantity comprises a measure of disturbance energy.

21. The apparatus of claim 17, wherein the disturbance quantity comprises a measure of an initial peak of disturbance energy signal.

22. The apparatus of claim 17, wherein the estimate of the direction indicates one of a forward direction and a behind direction with respect to the apparatus, and the estimate of the direction is derived from the polarity of the disturbance quantity.

23. The apparatus of claim 19, wherein the estimate of the direction indicates one of a forward direction and a behind direction, and the estimate of the direction is derived from the polarity of the initial peak of the disturbance power signal.

24. The apparatus of claim 20, wherein the estimate of the direction indicates one of a forward direction and a behind direction, and the estimate of the direction is derived from the polarity of the measure of the disturbance energy.

25. The apparatus of claim 21, wherein the estimate of the direction indicates one of a forward direction and a behind direction, and the estimate is derived from the polarity of the initial peak of the disturbance energy signal.

26. The apparatus of claim 17, wherein the logic circuit further comprises:

a computer readable storage medium operative to store a program, the program comprising an instruction code; and

a processor operatively coupled to the storage medium and operative to perform a processing function based upon the instruction code.

27. In a power grid a method for estimating a relative direction from a monitoring location on a line to a source of a disturbance, the method comprising:

monitoring a current flowing through the line in the power grid at the monitoring location;

monitoring a voltage on the line in the power grid at the monitoring location,

determining a disturbance power flow through the line; and

based on the disturbance power flow through the line, estimating a relative direction to the source of the disturbance from the monitoring location.

28. The method of claim 27, wherein the relative direction to the source of the disturbance from the monitoring location is based upon the polarity of the initial peak of the disturbance power.

29. The method of claim 27, further comprising the step of:

determining the disturbance energy flow in the line based on the disturbance power flow through the line;

wherein the estimating of the relative direction to the source of the disturbance from the monitoring location is also based upon the disturbance energy flow in the line.

30. The method of claim 29, wherein the final value of the disturbance energy is compared to the peak excursion of the disturbance energy.

31. The method of claim 30, wherein the estimate of the relative direction to the source of the disturbance from the monitoring location is based upon the polarity of the final value of the disturbance energy.

32. The method according to Claim 29, wherein:

the estimate of relative direction to the source of the disturbance from the monitoring location is based upon the polarity of the final value of the disturbance energy if final value of the disturbance energy is at least about 0.8 multiplied by the peak excursion of the disturbance energy; and

the estimate of relative direction to the source of the disturbance from the monitoring location is based upon the polarity of the initial peak of the disturbance energy if final value of the disturbance energy is not at least about 0.8 multiplied by the peak excursion of the disturbance energy.

33. In a power grid a method for determining a relative direction from a monitoring location on a line to a source of a disturbance, the method comprising:

monitoring a current flowing through the line in the power grid at the monitoring location;

monitoring a voltage on the line in the power grid at the monitoring location,

determining a disturbance energy flow through the line; and

based on the disturbance energy flow through the line, estimating a relative direction to the source of the disturbance from the monitoring location.

34. The method of claim 33, wherein the monitoring of the current is performed using a current probe coupled to a current transformer.

35. The method of claim 33, wherein the monitoring of the voltage is performed using a voltage probe coupled to a voltage transformer.